

Industry Review

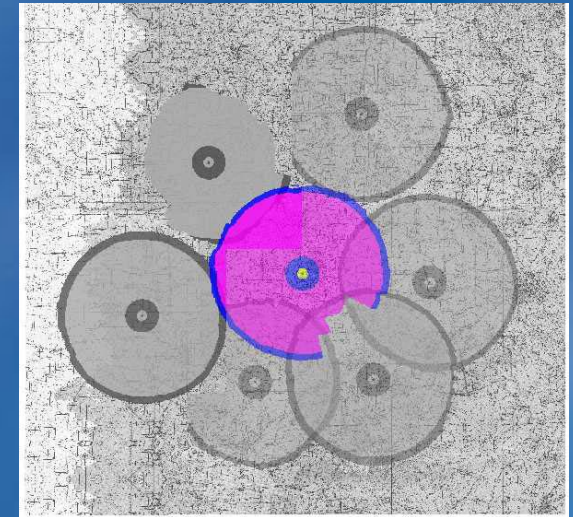
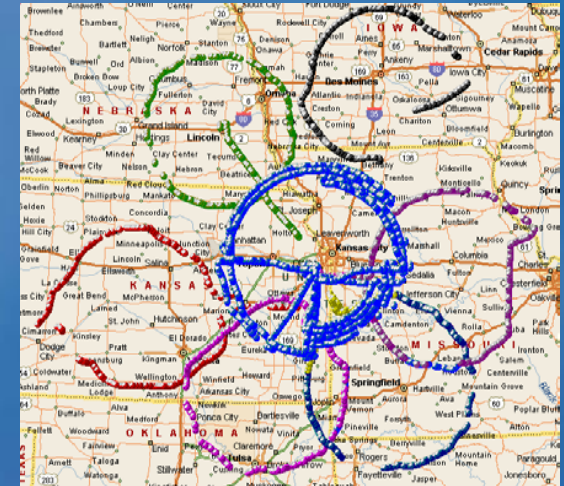
November 20, 2002
NASA WxAP Review

Jim Joyce
Honeywell International Inc.

History

- NavRadio Corp, Golden, CO develops VDL Mode 2 system per NASA Agreement
- NavRadio acquired by AlliedSignal, merged with GA division, which manufactures Bendix/King line of avionics
- AlliedSignal and Honeywell merge
- Honeywell develops commercial FLS system per FAA contract

VDL Mode 2 RF Propagation Study



Performed computer propagation simulation

Extensive flight testing to verify simulation accuracy

Test Range Operations

AWIN Transmitter



Simulator



CoWS

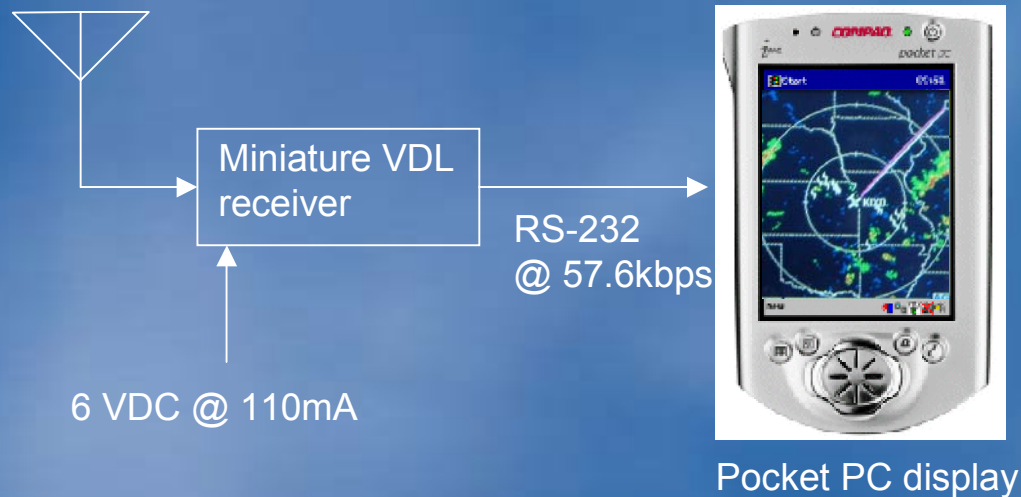


WARP

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Technology Development - Mini VDL

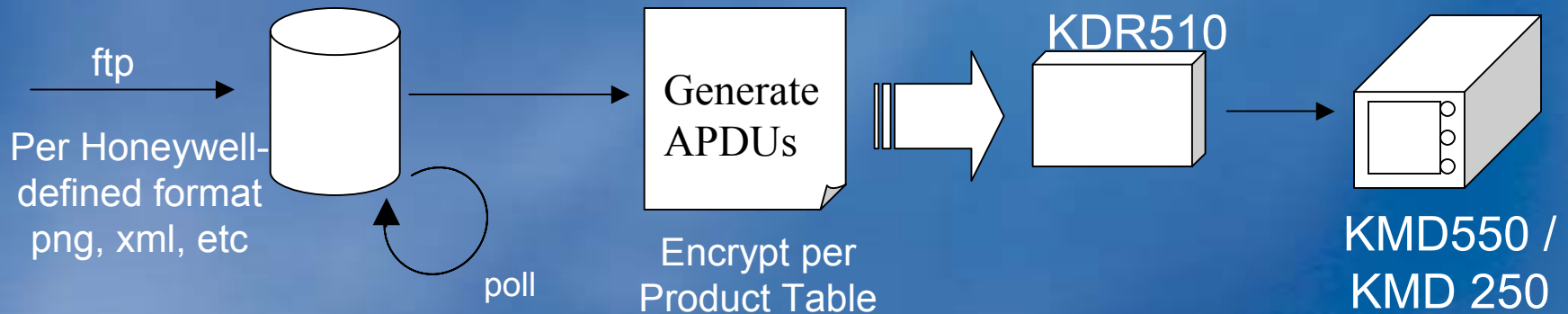
Demonstration System



- Generated Project Plan
- Designed and built Miniaturized Module
- Performed System Test
- Demonstrated with live FIS Broadcast Data in April 2002

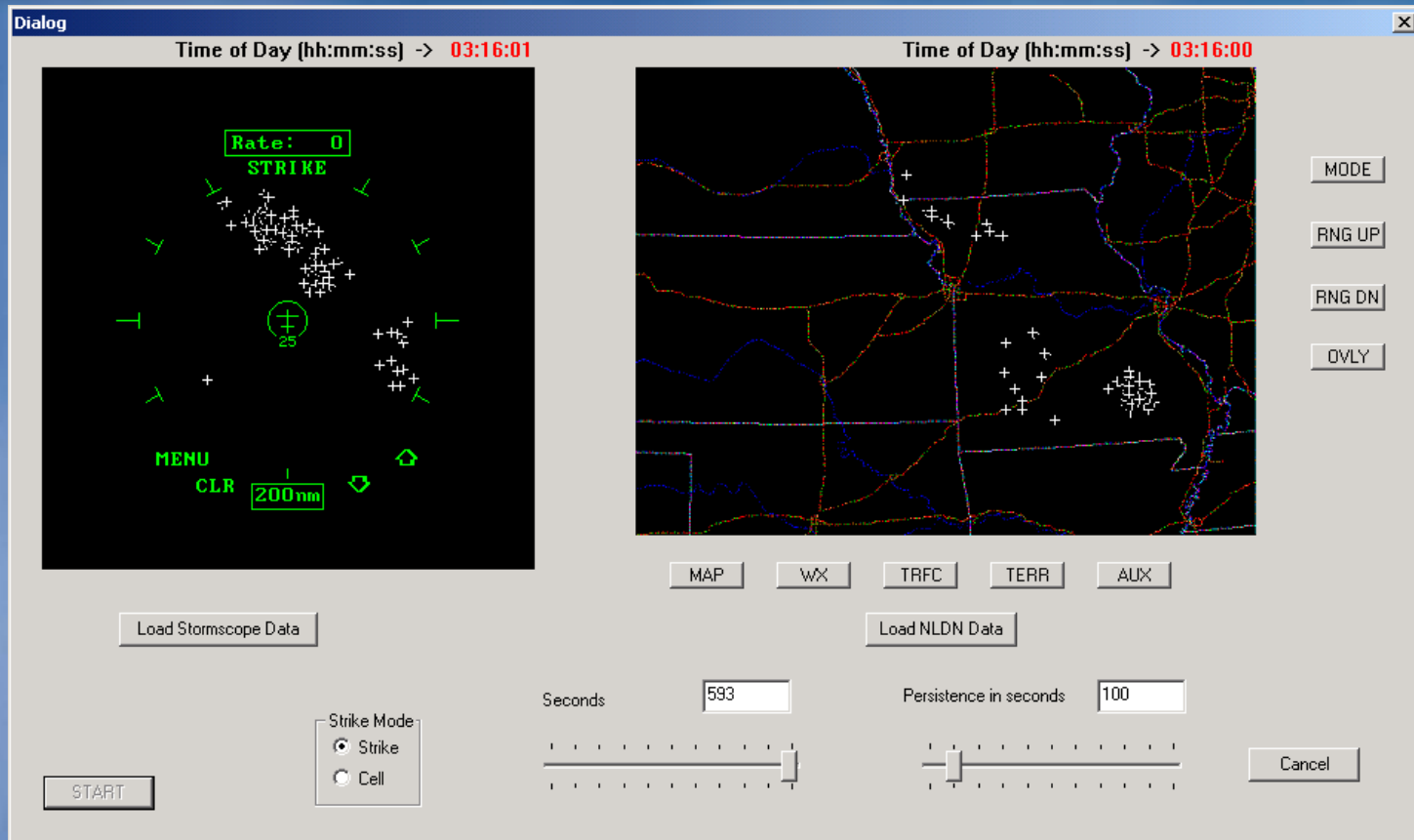
NASA Private Experimental Channel

Supports future NASA experiments
using the FIS network infrastructure



- Develop Interface Spec
- Generate Private Channel Testbed
- Make Portal Available to NASA
- Participate in Periodic Use Reviews
- FAA Approval for the PEC Received
- Prototype Testbed in Place

Datalink Lightning Demo System



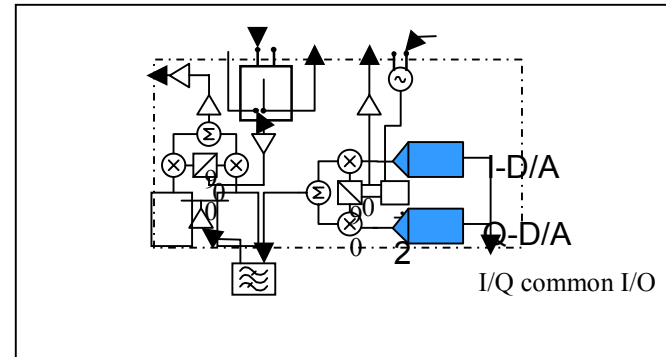
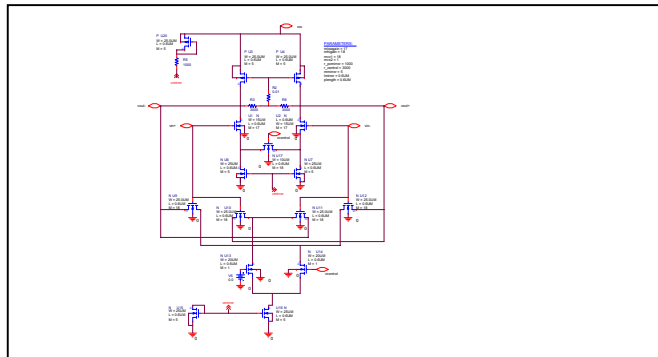
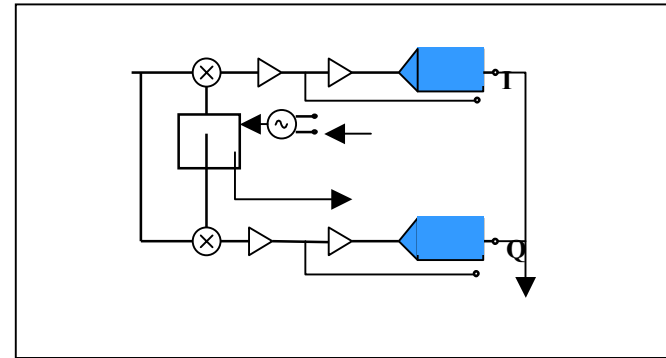
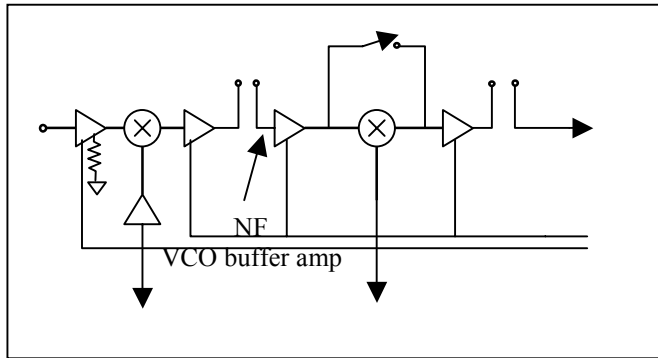
- Developed a system that collects lightning data
 - NLDN Data
 - On-board Sensor (mounted on the ground)
- Displays the data side-by-side

Datalink Lightning Demo System

- Used to analyze the difference between datalinked and on-board lightning presentations
 - Data latency
 - Cloud-cloud vs cloud-ground
 - Positional accuracy
- Understand how to educate users on how to interpret and use datalinked lightning information

A high percentage of GA aircraft are equipped with lightning detection devices

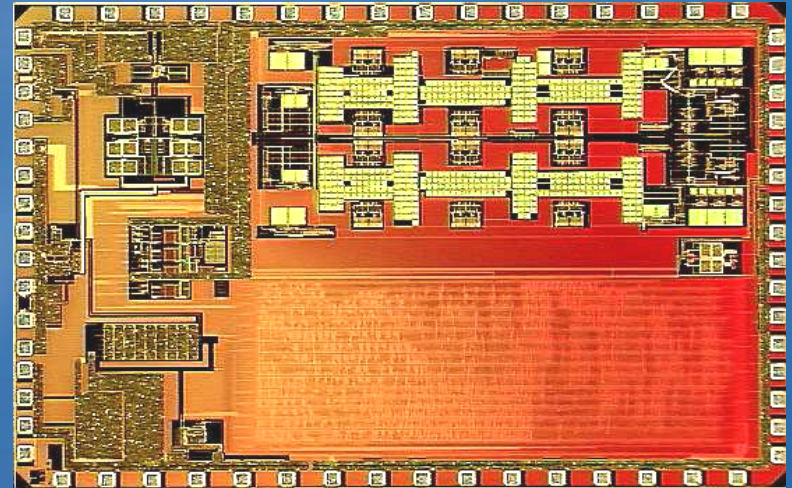
Technology Development - Radio Chip



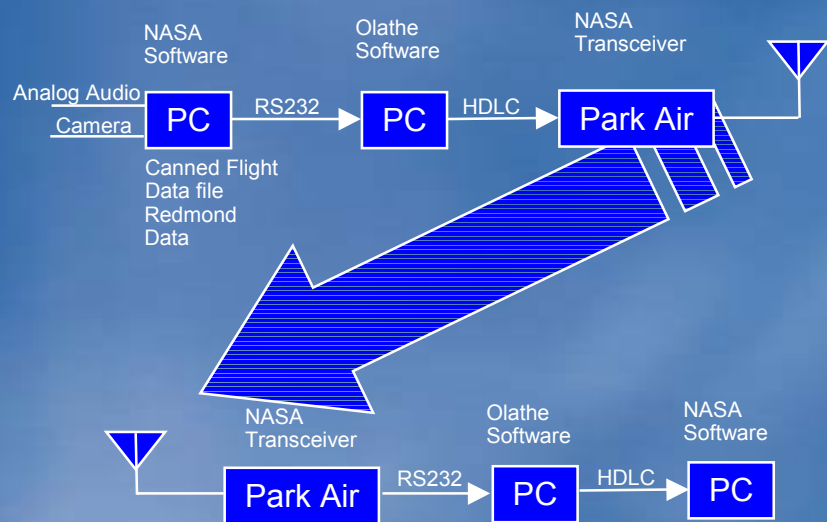
Supports VDL Mode 2 and Mode 3
Transmit and receive capability
Brings FIS into low-end Nav/Com
- Broadens access to weather in the cockpit

Technology Development - Radio Chip

- ED-92 Compliant
- 0.6 micron CMOS technology
- 75-350 MHz
 - Can be used for Marker Beacon through Glide Slope
- 64 pin plastic SOIC
 - Highly Integrated
 - Low Power
 - Integrated fractional-N synthesizers
 - Integrated A/D and D/A converters
 - SPI programming interface



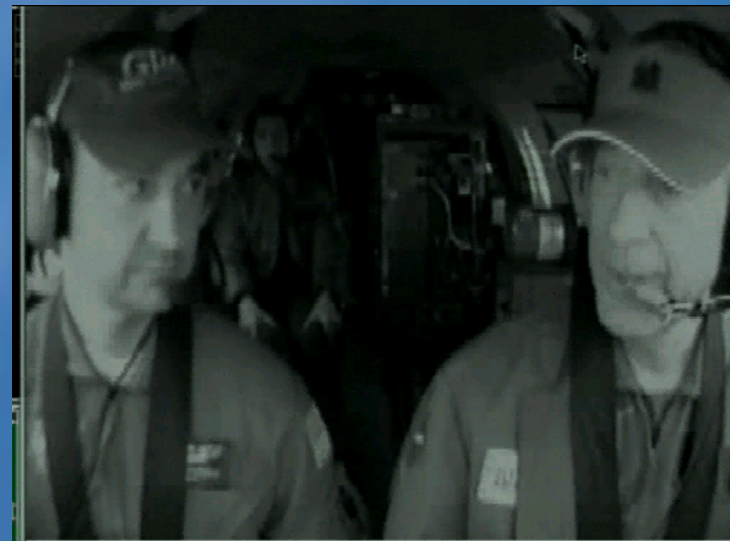
Aviation Security Demo



Olathe
Provide capability to send data stream to & from PARK Air
VDL Mode 2 Transceivers
Leverage FIS propagation flight test experience

Redmond
Generate Flight Data file with representative parameters and
file sizes

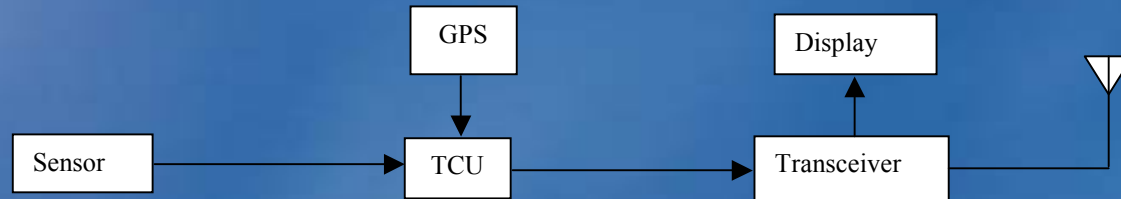
NASA
Develop interfaces to audio and imaging sources, generate
RS232 data stream, decode data on ground



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TAMDAR Report

- Generated a report that discussed the usage of VDL Mode 2 FIS as a vehicle for downlinking TAMDAR information
- Further study recommended
 - Data throughput requirements
 - Ground infrastructure impact
 - Alternate approaches
 - Implementation funding scenario



FISDL Program Overview



Government/Industry
Collaboration

FAA / Honeywell

Affordable, Real-time
data linked weather to
the cockpit

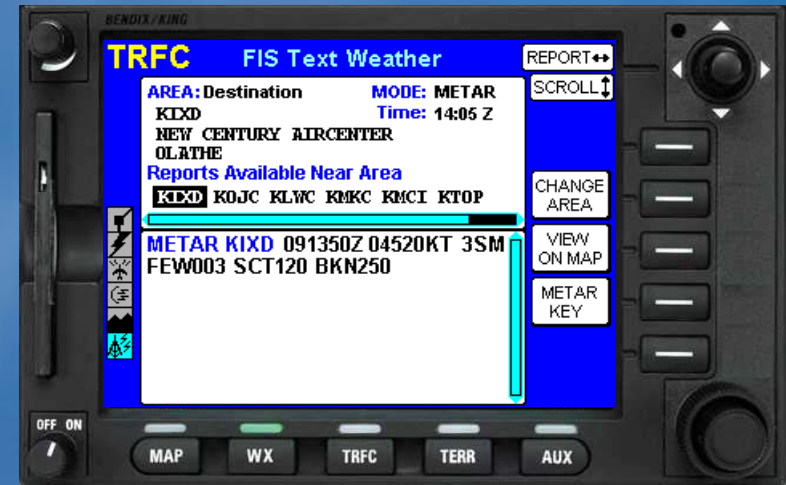
Basic text products
broadcast for free

Subscription fee charged
for value-added and
graphics products

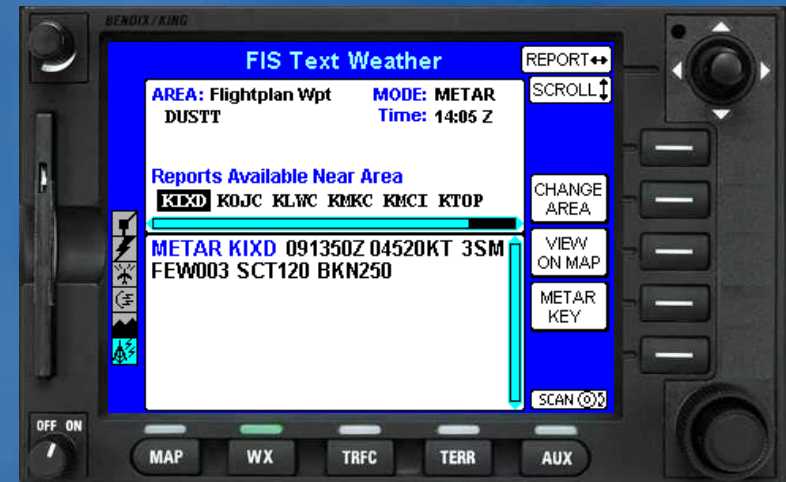
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Text Weather Page

- **FIS Text Weather Page** accessed by **WX** key
- **MODE** key selects which text product to be displayed
 - METAR
 - TAF
 - PIREP
- **CHANGE AREA** softkey selects area to use for list of available weather reports
 - Destination (from FPLN)
 - Flightplan Wpt
 - Nearest
 - User Defined
- **Joystick left/right** selects report
- **Joystick up/down** scrolls report window
- **Inner knob** scans through list of flightplan waypoints when selected area is Flightplan Wpt



Destination

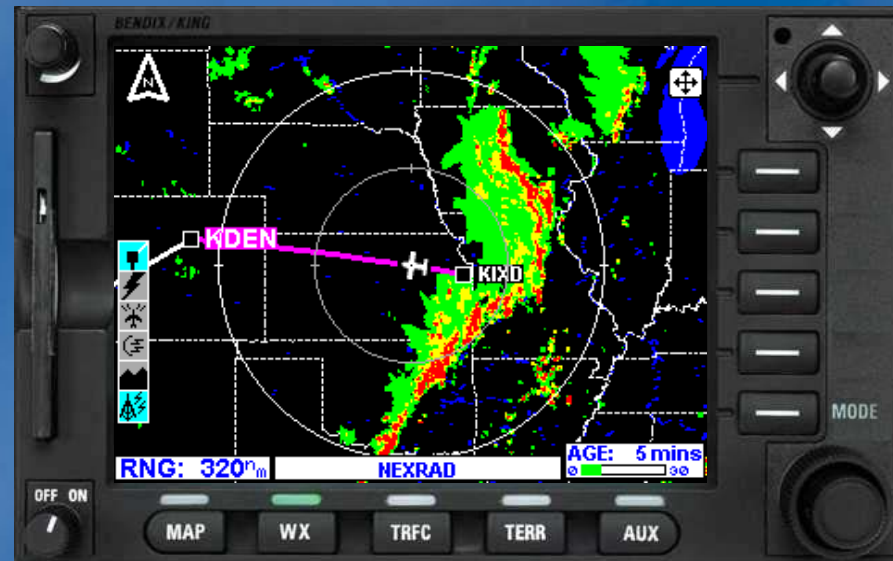


FPLN Waypoint

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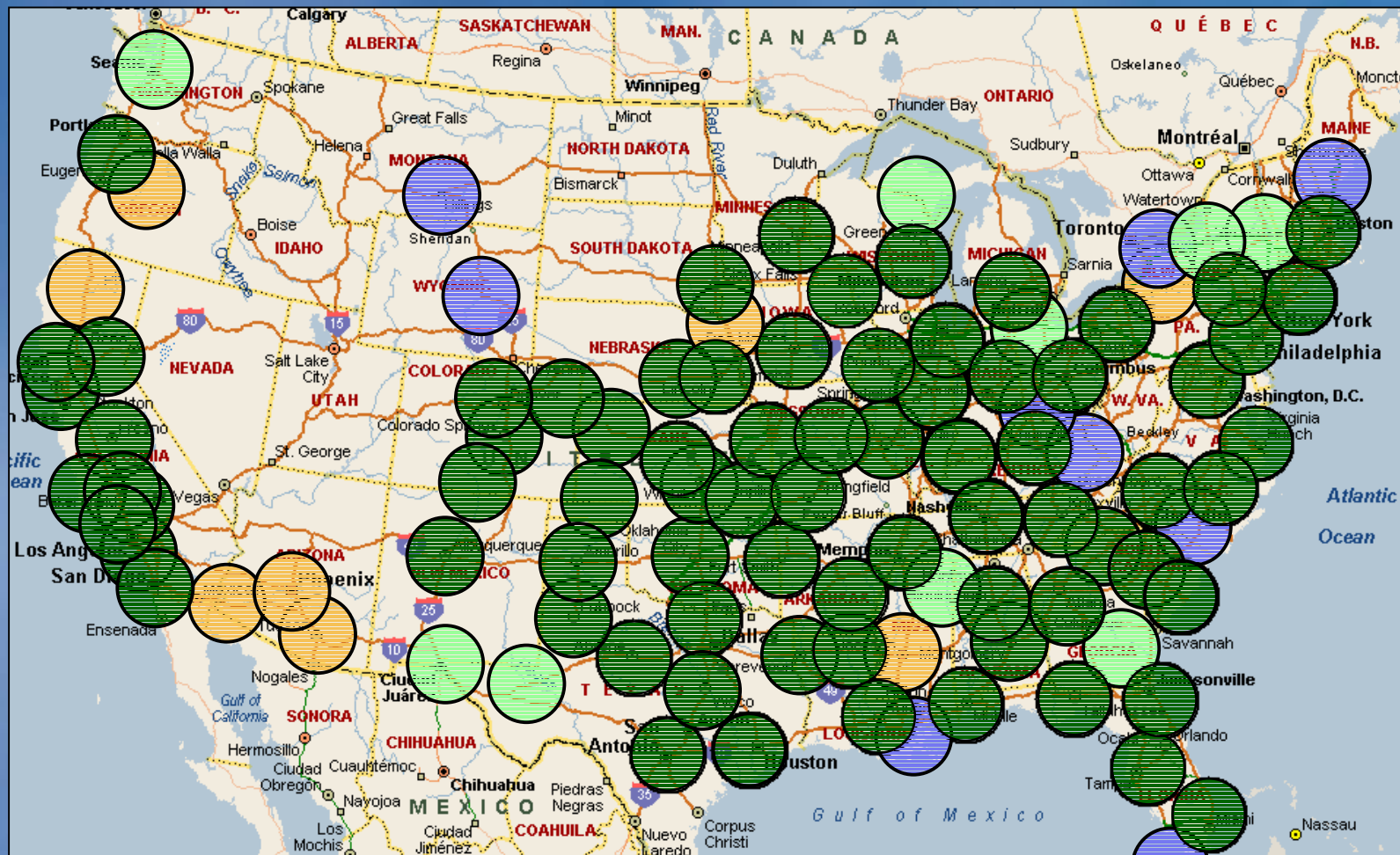
FIS Graphical Weather Page

- Accessed by WX key
- MODE key selects between graphical products
 - NEXRAD Base Reflectivity
 - 4 km national NEXRAD data
 - Graphical METARS
 - Complete national set
- Product labeled at bottom of screen
- Display Features
 - North Up Orientation
 - Airplane present position icon
 - Political Boundaries
 - Major Waterways
- OVLY key controls overlays
 - Flightplan
 - Stormscope lightning
- RNG keys control zoom level
- Joystick controls panning
- Age of data and expiration time displayed



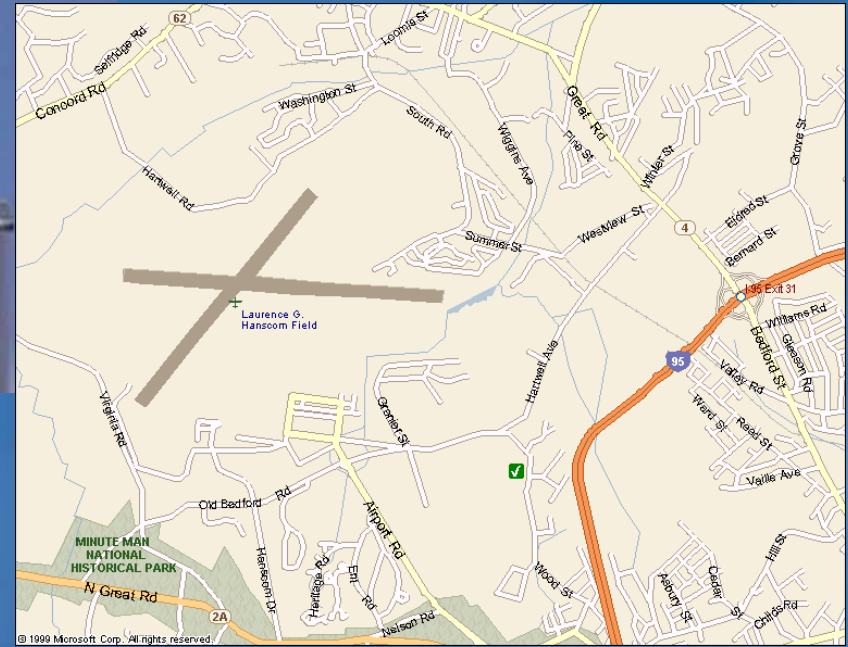
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Coverage at 5,000 ft AGL



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Bedford, MA FIS Installation



Opportunities for Further Cooperative Work

- TAMDAR downlink architecture
- Security-oriented downlinks
- Advanced Graphical Weather Products
 - Animation
 - NCWF
 - Blended/combined products
- Hazard Map
- 3D Weather products over datalink
- Usability of AT VDL2 Radios for FIS